



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

PDR

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DOCKET NO.: 70-371

LICENSEE: United Nuclear Corporation (UNC)

FACILITY: Naval Fuel Fabrication Plant  
Montville, Connecticut

SUBJECT: REVIEW OF LICENSE AMENDMENT APPLICATION  
DATED MARCH 22, 1978, AS SUPPLEMENTED  
MAY 25 AND DECEMBER 15, 1978, CONCERNING  
A HORIZONTAL FUEL SPACING CRITERION  
(CLASSIFIED), PC 78057A, MC

Background

By classified application dated March 22, 1978 (with license pages dated March 20), reference NIS:78-3-31, United Nuclear Corporation (UNC) requested a license amendment authorizing use of a horizontal fuel spacing criterion. UNC's letter of May 25 provided answers for most of the questions on this application - one of four applications from UNC all dated March 22, 1978 - that were raised in a telecon on May 8, 1978, and recorded in the memorandum of May 15, 1978. The NRC letter to UNC dated October 19, 1978, questioned the adequacy of the safety margin provided by UNC's proposed criterion and hence UNC revised the criterion and provided further justification in the December 15, 1978, supplementary information.

Discussion

The application is concerned solely with nuclear criticality safety during fuel handling and storage. UNC made new calculations to validate the calculational method, which uses the KENO IV Code and Hansen-Roach cross sections, against critical experiments for a variety of high enriched systems. The proposed criterion for using the method includes a 0.05 margin of safety in the multiplication factor to allow for calculational uncertainties. The safety margin is deducted from the predicted low value of keff at the 95% confidence level for the experimentally critical systems used in the validation. This approach appears to be in substantial agreement with the draft criterion now under development by Standards Subcommittee 8 of the ANS Standards Committee. The general validity of UNC's conclusion on the method is confirmed by reference to document Y-1858 "Validation Checks of the ANISN and KENO Codes by Correlation With Experimental Data", GRHandley and CMHopper, November 20, 1972.

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The systems mocked up in the calculations to confirm the spacing criterion included allowance for reflection by concrete, accidental moderation of the fueled units, failure of units to fall strictly within a single plane, and low density moderator between units. The spacing criterion as modified meets the criterion for a safe multiplication factor derived from the new validation calculations as stated in the foregoing paragraph.

The revised spacing criterion was discussed with Mr. J. Roth, I&E Region I principal inspector of the UNC Plant, in telecons on May 5, 1978, and February 2, 1979. Mr. Roth's comments on the original application were included in those listed in the memorandum of May 15, 1978. Mr. Roth made no judgement on the adequacy of the safety margin in the validation calculations accompanying the December 15, 1978, supplementary information.

#### Conclusion

The proposed spacing criterion provides assurance of nuclear criticality safety under the defined conditions and under conditions of accidental moderation. However, the reference to the solid angle method as defined in Section 3 of Part I in the penultimate paragraph of page 10.0-2 dated March 20, 1978 could be misleading. Attention should be called to para. 8.2.3.2 for the additional constraints imposed in Amendment No. 6 and placed into license format in Amendment No. 10. Approval of the proposed specified spacing criterion is therefore recommended subject to the foregoing clarification as regards use of the solid angle method.

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